

REMARKS

Claims 4 and 5 have been rejected by the Examiner under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention. This rejection is respectfully traversed.

As the Examiner will note, claims 4 and 5 have been amended to remove the objectionable expression referred to by the Examiner and accordingly, it is believed that this rejection has been eliminated.

Claims 1-5 and 8 have been rejected by the Examiner under 35 USC 102(b) as being anticipated by WO 02/17313A1 to Hulin et al. (English Equivalent, U.S. Patent Publication No. 2004/0023142A1). Claim 9 has been rejected by the Examiner under 35 USC 103(a) as being unpatentable over Hulin 313 in view of U.S. Patent, 5,270,445 to Hou. Also, claim 10 has been rejected by the Examiner under 35 USC 103(a) as being unpatentable over Hulin 313 in view of GB 2,111,522A to Bamba. These rejections are respectfully traversed.

The present invention is directed to a powder metallic coating material comprising a flake pigment and a resin powder which exhibits a high coating brightness, and an excellent substrate hiding property, an effective introduction ratio and a substantial elimination of coating spit formation of the metallic coating material. According to the present invention, the above advantageous results can be achieved by establishing the relationship between the charged value of the flake pigment and the charged value of the resin powder which is defined by the following relationships:

$$|C_R - C_A| \leq 10 \quad \bullet \bullet \bullet \quad (1)$$

$$10 \leq |C_A| \leq 40 \quad \bullet \bullet \bullet \quad (2)$$

where C_A denotes the charge value ($\mu\text{C/g}$) of said flake pigment and C_R denotes the charge value ($\mu\text{C/g}$) of said resin powder.

As can readily be seen by referring to Table 2 of the present application, when $C_R - C_A$ ($\mu\text{C/g}$) is equal to or less than 10 as shown in Examples 1 to 5 of the present application, a very effective introduction ratio (%), a high coating brightness (β/α) a substantial elimination of coating spit formation and an excellent substrate hiding property can be achieved. This is to be compared with Comparative Examples 1 and 2 as shown in Table 2 of the present application, where it can be readily seen that when $C_R - C_A$ is greater than 10, that is 15.8 and 15.4, respectively, all of the parameters referred to hereinabove, that is, the introduction ratio, the coating brightness, the spit formation and the substrate hiding property were substantially inferior to the present invention. Thus, claim 1 of the present application defines a specific relationship with respect to the charge control agent coated on the surface of the base particle and the charge value of the resin powder which is effective in achieving the Applicant's inventive contribution.

Hulin 313 is directed to a universal carrier for two component developers of an electrophotographic printing system. More specifically, Hulin 313 is directed to providing a two-component developer that requires no pre-aging but can be produced by simply combining carrier and toner and is ready to use without jointly pre-aging the carrier and the toner. The pre-aging can be performed with the binder resin and/or at least one surface additive or alternatively the pre-aging can also be performed with a wax. Clearly, Hulin 313 is not concerned with providing a powder metallic coating material having the properties of coating brightness, excellent substrate hiding, and the like, as defined by the present invention, but is directed to solving a completely different problem associated with two-component developers for an electrophotographic printing system. Thus, it is important for the Examiner to understand that electrophotographic printing is a technique and technology totally different from the porous metallic coating material of the present invention. Thus, while the present invention relates to a powder coating, Hulin 313 relates to a two-component developing agent for an electrophotographic printing system. Please see paragraphs [0003] to [0007] of U.S. Patent Publication 2002/0064724A1 attached hereto. Thus, since the present application and Hulin 313

belong to totally different technical fields, Hulin 313 simply does not qualify as effective prior art with respect to the present invention.

In the case where the development of an electrostatic latent image is carried out on a photoconductor using the two component developing agent of Hulin 313, the magnetic carrier and the toner are stirred in a developing container and only the toner is consumed, so that the magnetic carrier can be repeatedly reused (see paragraph [0002] of US2004/0023142A1, which is a counterpart application of Hulin 313). Thus, the magnetic carrier of Hulin 313 (a carrier base component in claim 1) only temporarily carries the toner (a carrier preaging component in claim 1), and it is basically different from the claimed flake pigment in which the surface is coated with a film containing a charge control agent.

Since there is not even the remotest suggestion in the Hulin 313 prior art reference of the desirability of defining a charge control relationship between the flake pigment and the resin powder for achieving the Applicant's advantageous results, it is clearly understandable that Hulin 313 is not even remotely concerned with the Applicant's problem or the Applicant's solution to said problem.

The Examiner, on page 3 of the Office Action letter, recognizes that Hulin 313 is silent with respect to the charge value relationship between the carrier and the resin as specifically set forth in claim 1 of the present application. However, the Examiner attempts to overcome this deficiency by arguing that the claimed charge value relationship would be inherent in the composition of Hulin 313. However, when relying on the theory of inherency, the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristics necessarily follow from the teachings of the applied art. See, *Ex Parte Levy* 17 USPQ (2nd) 1461, 1464 (B.D. Pat. App. and Int. 1990). There can be no speculation or only possibilities involved in a holding of inherency. What is alleged to be inherent must necessarily occur. The mere fact that something may result from a given set of circumstances is not sufficient. *In re Oeirich*, 212 USPQ 323, 326 (CCPA 1991). Thus, inherent

anticipation requires that the missing descriptive material is “necessarily present,” not merely probably or possibly present in the prior art.

Claim 1 of the present application defines a specific relationship which is effective in producing specific results which are not defined, identified or contemplated by the prior art relied upon by the Examiner. To conclude, as the Examiner has done, that the parameters identified by the Applicant are merely inherent in the teachings of Hulin 313 without providing a basis in fact or without providing technical reasoning to support such a conclusion amounts to a rejection of the claims of the present application in view of the Applicant’s own disclosure.

Claims 9 and 10 have been further rejected by the Examiner under 35 USC 103(a) by further relying upon Hou 445 in connection with claim 9 and Bamba 522 in connection with claim 10. However, since both of these claims are dependent from claim 1, it is believed that for the same reasons as discussed hereinabove, claims 9 and 10 are also believed to be patentable over all of the prior art references relied upon by the Examiner, either alone or in combination.

As the Examiner will note, claims 11-15 have been added to the present application to merely cover additional features of the present invention. It is believed that these newly added claims are patentably distinguishable over the prior art for the same reasons as claim 1 as discussed hereinabove.

Accordingly, in view of the above amendments and remarks, reconsideration of the rejections and allowance of all of the claims of the present application are respectfully requested.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Joseph A. Kolasch Reg. No. 22,463 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

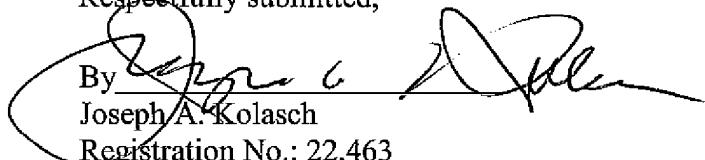
Application No. 10/568,530
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Docket No.: 0033-1063PUS1

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

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Respectfully submitted,

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Attachment: US 2002/0064724 A1 (2 pages)



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Nakamura et al. (43) Pub. Date: May 30, 2002(54) TWO COMPONENT DEVELOPING AGENT
AND AN IMAGE FORMING APPARATUS BY
USE OF THE SAME

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(57) ABSTRACT

There is disclosed a two-component developing agent for use in an image formation based on electrophotography, which has high developability even at a high speed printing and good developability in the case of the image formation for a long period of time. The two-component developing agent includes a carrier comprising a magnetic particle and an insulating toner. A surface of the magnetic particle is coated with at least a resin. A mean particle size of the magnetic particle is between 30 and 90 μm and an aggregation degree of said carrier is between 2 and 15%.

(21) Appl. No.: 09/768,290

(22) Filed: Jan. 25, 2001

TWO COMPONENT DEVELOPING AGENT AND AN IMAGE FORMING APPARATUS BY USE OF THE SAME

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a two-component developing agent for use in a development of an electrostatic latent image formed on a photoconductor based on an electrophotography. In addition, the present invention is to provide an image forming apparatus in which the above two-component developing agent is used such that an image formation can be achieved at a high speed and good printing characteristics can be kept for a long time.

[0003] 2. Description of the Related Art

[0004] Electrophotography known in the art includes a system described in U.S. Pat No. 2,297,691 and the like. In this system, a photoconductor (such as photoconductive drum or the like) is generally used, an even electrostatic charge is provided on a surface of the photoconductor by means of corona discharge or the like. An optical image is applied onto the photoconductor by various means to form an electrostatic latent image thereon that is then developed with a fine powder called a toner.

[0005] If necessary, the toner image is transferred onto a recording medium, such as a paper. The toner image is then melted by means of pressing, heating, solvent vaporizing, light irradiating or the like so as to fix the toner image onto the recording medium, thereby providing a printing product. For example, an image forming apparatus for use in the above process includes a printer, a copying machine, a facsimile or the like.

[0006] As the developing agent for use in the image forming apparatus, there is known one-component developing agent comprising only a toner particle and a two-component developing agent comprising the toner particle and a carrier. In more recent years, a need exists for the image forming apparatus in which the image formation can be achieved at a higher speed. To this end, it is more suitable to use the two-component developing agent.

[0007] The above two-component developing agent comprises a carrier particle having a general magnetic character and an insulating toner particle. In a case where the development of electrostatic latent image is carried out on the photoconductor, only the toner is consumed while stirring the carrier and the toner in a developing container, so that the carrier can be reused. Since a predetermined voltage from the carrier is provided onto the toner with stirring, the toner is transferred to the photoconductor so as to form a toner image thereon. However, a balance between the charging and the discharging of both the toner and the carrier may be broken due to a stirring stress, thereby giving rise to the excessive charging, the stripping of a coating resin from a surface of the carrier and a change in an electric resistance due to filming of the toner onto the surface of the carrier.

[0008] Since the developability of the toner is dependent on a charge amount of the toner and a strength of an electric field at a developing region, an excessive increasing of a charging amount of the toner results in a decrease in the number of the toner attractive to the electrostatic latent

image, thereby leading to a decrease in a printing density. In addition, with the stripping of the coating resin from the carrier surface and the filming with the toner, the electric resistance of the carrier may be increased. In such a case, the electric field for the development is weakened to deteriorate developability, thereby providing a lower printing density of a print. It is necessary to replace the two-component developing agent with a new one when a state of the toner and carrier becomes worse and the printing density is below an acceptable value.

[0009] On the other hand, in a high speed printer where the recording medium is transported at a speed more than 1 m/s and the printing is carried out more than 150 sheets per one minute, there exists a long-felt need for a long-range term of a replacement cycle of the two-component developing agent from the view points of maintenance and the low running cost.

[0010] To this end, Japanese Laid-Open Patent Application No. 7-72668 describes a two-component developing agent having a long lifetime by modification of a silicone resin with a fluorine atom. However, the technology disclosed in the above application results in a charge-up due to the excessive charging when printing at the high speed more than 1 m/s, thereby providing the inability of extending the lifetime of the carrier.

[0011] Additionally, an extensive study of a coverage of the carrier with the coating resin showed that good printing performance can be obtained with the relative low coverage. For example, Japanese Laid-Open Patent Application No. 4-188162 teaches an approach in which the coverage of the carrier with the coating resin is less than 12%. However, when printing at the higher speed with the developing agent disclosed in the Japanese Laid-Open Patent Application No. 4-188162, an increase in the electric resistance of the carrier can not be inhibited.

[0012] Japanese Laid-Open Patent Application Nos. 57-96355 and 1-29856 describe a more than 2 layers coating method by use of the silicone resin and a coating method by mixing different resins, respectively. However, when the image formation is carried out at the high speed by use of the above technologies, the stripping may occur at a boundary face between the resins on each surface of the carriers so that the above technologies can not be applied to the high speed printing based on the electrophotography.

[0013] Further, Japanese Laid-Open Patent Application No. 10-20562 teaches the use of the silicone resin having a uncured component of less than 4.3%. In addition, Japanese Patent No. 62-61948 describes the use of silicone resin having the uncured component of less than 30%. Under these conditions, the toner filming and the charge-up problems can not be inhibited sufficiently.

[0014] Therefore, the present invention has been made in view of the above-described problems of the prior art.

SUMMARY OF THE INVENTION

[0015] Accordingly, it is a general object of the present invention is to provide a two-component developing agent for use in an electrophotographic method and an image forming apparatus by use of the same wherein the foregoing problems are eliminated.